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Abstract

GAMMA ENERGY RELEASE RATES FROM FISSION PRODUCTS AT SHORT TIMES OF COOLING

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In the present paper the gamma energy release rates and photon emission rates from fission product mixture formed from the instantaneous fission of uranium-235 have been computed. The data on fission yields, half-lives and gamma decay energies have been taken from our latest compilation (complete upto June 1962) of the nuclear properties of uranium-235 fission products. The gamma spectrum is presented by dividing the fission product gamma energies into ten groups on the basis of their weighted average energies and weighted average air dose characteristics. The variation of gamma energy release rates, photon emission rates and weighted average energy in each group and in the total fission products have been studied. The results are plotted for decay times ranging from 10^{-1} to 10^{5} seconds. The gamma energy release rates presented in this paper are found to be a significant improvement over the existing computed values at cooling times less than 1000 seconds. Above 1000 seconds the values agree with the computed values obtained by earlier workers.

A new experimental technique has been developed to estimate the time dependance of gamma energy release rates at times of cooling in the region of milli-seconds and onwards. The decay of the gammas starting from this time region has been followed by taking the fast movie photos of the scalers counting the photons from fission products has been adopted for converting the results obtained for finite irradiation to the case of instantaneous fission. The experimental curve of count rate versus time is slightly steeper than the experimental curve of Fermi and King and is more or less in agreement with the slope of the total energy curve of Way and Wigner. Carver's speculation on the gamma energy release rate in the time region of fraction of a second after fission gives a steeper slope than the results obtained in the present experiment.